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protection. In Texas, however, cotton is grown under a great variety of conditions. The climatic vicissitudes of heat and cold, drought and flood are many times as great as in Guatemala, so that notwithstanding the unexpectedly great adaptability of the kelep it can not be expected to thrive equally well in all parts of the state, any more than does the weevil. Even if it be found that the ants can thrive, breed and establish new colonies in Texas, they will probably require many years to take full and effective possession even of the more favorable localities of this vast agricultural empire. Such a mitigation of the weevil's injuries would be, of course, of great practical value, and the work of the ants in destroying the larvæ of boll worms and leaf-worms might be only slightly less important in some districts. If, however, the hope of exterminating the weevil is to be cherished, or that of staying its ravages before it has laid the entire cotton industry of the South under tribute, there would seem at present to be no other alternative than to secure by discovery or development, within the next few years, a variety of cotton in which the larvæ of the boll weevil can not mature.

The present brief outline of the results of our study of cotton in Guatemala may be summarized by saying that the tendency to rapid growth and early fruiting, the large extrafloral nectaries which attract the ants, and the proliferation of the tissues of the young buds and bolls which kills the weevil larvæ, are protective adaptations, developed as a result of long contact between the cotton plant and the boll-weevil. The proliferation is not a mere pathological abnormality, but represents a definite evolutionary tendency, capable of further increase by selection. If this interpretation of the facts be correct it affords an intimation of a successful

solution of the weevil problem by means of a resistant variety of cotton.

O. F. COOK.

WASHINGTON, November 4, 1904.

#### SCIENTIFIC BOOKS.

*Dr. J. Frick's Physikalische Technik oder Anleitung zu Experimentalvortragen sowie zur Selbstherstellung einfacher Demonstrationsapparate.* Siebente vollkommen umgearbeitete und stark vermehrte Auflage von Dr. OTTO LEHMANN. Friedrich Vieweg und Sohn. 1904. Pp. xxiii + 630.

The previous edition of this well-known standard work appeared in 1890-5 and consisted of two volumes, one of 725 pages, the other of 1,054. It is most interesting to note that there exists such a demand for a book of this character as to encourage the publishers to undertake the present seventh edition on such an enormous scale. This is to consist of two volumes; and of these the first part of the first volume only has so far appeared, having been published during the past summer. This is a volume of 630 pages and is illustrated with over 2,000 cuts. The scope of the present work as compared with previous editions may be estimated when it is noted that the subject matter contained in the volume under review had devoted to it in the last edition only 132 pages and 65 cuts.

As the title of the work indicates, it has a twofold object: one to suggest suitable experiments for class demonstrations, the other to give accurate instruction in the use of instruments, tools and technical methods. The subtitle of the first part of the first volume is 'The Rooms of a Physical Laboratory and their Equipment, together with an Introduction to the Use of the Latter.' There are five chapters: (1) 'Physical Demonstrations and the Laboratory Building'; (2) 'The Large Lecture Room'; (3) 'The Preparation Room and the Smaller Lecture Room'; (4) 'The Rooms for Apparatus and Assistants'; (5) 'The Rooms for the Mechanician and Janitor.'

There are numerous subdivisions of the chapters and full information is given in regard to almost every conceivable detail.

Methods of equipment of the lecture room with all kinds of power, and with water, gas, electricity, steam, etc., are fully discussed. Much information is given in regard to making rooms fire-proof and sound-proof; in regard to heating and ventilation; in regard to clocks, lighting, wardrobes, etc. All this is done with the utmost attention to details, and should prove of great assistance to architects, as well as to those responsible for the design and equipment of the laboratory.

In the chapter devoted to the description of the preparation room much extremely valuable information is given in regard to what may more strictly be called 'physical technique,' such as methods of working with leather and paper, glass-blowing, enameling, exposing and developing photographs, soldering of all kinds, and the use of various cements and waxes. This part of the book will, beyond a doubt, be of the most value to the worker in physics. Under suitable heads information of the fullest character is given in regard to the use of the lathe, of the forge, of the carpenter's bench, etc.

The fact that no detail, however insignificant, has been overlooked by the present editor of the book is shown by the inclusion in it of information concerning methods of tying knots, of pulling nails, of using even the simplest tools; and illustrations are given of such instruments as a crowbar, a hammer, a rubber glove and an oil-can. It may well be questioned whether such richness of detail is essential or advisable, but with a suitable index to the volume this ought to offer no serious objection. The need of an index, which is promised for the end of the first volume, is all the greater owing to the scanty information given by the table of contents, and to the fact that descriptions of many instruments are given in places where one would not expect to find them. Thus, under the heading 'Room for Delicate Work' is found the full description of Doleczalek's electrometer, of wire gratings and of the bolometer. These details may very well be given at this point of the book, as illustrations of the use of certain rooms in the laboratory; but with-

out a complete index one might well search in vain for information.

The present edition of this great work is incomparably better than any of the previous ones. The illustrations are more numerous, and the letter press more detailed. Special attention is given to pieces of apparatus of recent design, and all the latest improvements are mentioned; references are made, when possible, to the historical development of various methods and instruments, but obsolete forms are not described. Full information is given as to places where every piece of apparatus mentioned, every tool and every machine, may be purchased, and the prices of both instruments and supplies are indicated.

The value of a work like the present one to every director of a laboratory, and to almost every worker in physics, is well shown by the fact that a seventh edition is now in demand, and so it need not be emphasized in this review. This present work is the most complete of its kind and gives the necessary information in the most convenient form possible. The only drawback to its general use comes from the fact that the publishers have seen fit to use German type instead of Roman.

J. S. AMES.

*The Industrial and Artistic Technology of Paint and Varnish.* By ALVAH HORTON SABIN, M.S., chemist for Edward Smith and Co., New York. New York: John Wiley and Sons. Pp. 372. Price, \$3.00.

The work opens with two entertaining chapters upon the history and origin of varnish; these are followed by a description of the materials used in varnish and of its manufacture.

Especially noticeable are the parts treating of oils, paints and lacquers in China and Japan. The reviewer knows of no place where an equally interesting and instructive account of these Oriental arts can be found.

The specific value of the work consists in the attention paid to the protection of metals against corrosion and to water pipe coatings; these detail some experiments made upon large plates of steel and aluminum protected by various paints and varnishes when exposed to sea and lake water. These have not been